

SCIENCE

And Technology Program



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Electrical faults often develop within the high-voltage stator winding of a generator or motor as small cracks or punctures in the insulation. Usually, there is very little associated damage to other parts of the machine. Once the location of the fault has been determined, it can often be repaired with minimal disturbance to the bulk of the winding. However, existing methods for locating this type of fault are uncertain, time-consuming, and can sometimes be destructive to undamaged portions of the winding.

The objective of this project is to develop a prototype portable smart detector and test method for pin-pointing hidden faults in large synchronous machine stator windings. The technique involves tracking low-energy pulse currents in the winding that are created by a controlled, intentional flashover at the fault location. The low-energy pulse currents will be magnetically traced with a pair of hand-held probes which are guided to the point of the fault by the smart detector. The detector will alert the operator when the probes bracket the hidden fault.

The concept of winding insulation fault location using low-energy pulse current was successfully demonstrated at Reclamation's Glen Canyon Powerplant during the 1997 investigation of the generator unit 8 stator winding failure. The Glen Canyon field test data were used to formulate the fault locating procedure. A functional block diagram of the detector circuit was completed. Preliminary circuit designs for all the detector functions were completed and reviewed.

Glen Canyon Powerplant

The flow chart of the fault locating procedure, functional block diagram of the smart detector, and circuit design of the detector electronics have been documented.